CUSTOMER NO. 22186 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re: Attorney Docket No. 1052.001

In re application of: George P. Vella-Coleiro

Serial No.:	10/068,343	Group Art Unit:	2631
Filed:	02/05/02	Examiner:	Pankaj Kumar
Matter No.:	Andrew 808	Phone No.:	571-272-3011

For: Frequency-Dependent Phase Pre-Distortion for Reducing Spurious Emissions in Communication Networks

DECLARATION UNDER 37 C.F.R. 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1. I, George P. Vella-Coleiro, am a resident alien and a citizen of Malta residing at 54 New England Avenue, Unit 6, Summit, New Jersey 07901.

2. I received a D.Phil. degree in Physics from Oxford University in England in 1967.

3. I have worked in the field of RF (radio frequency) signal processing since 1990.

4. I am the named inventor on the above-referenced patent application.

5. I have read U.S. patent no. 6,091,941 (referred to herein as "Moriyama") and U.S. patent no. 6,400,415 (referred to herein as "Danielsons").

6. Moriyama does not teach frequency-dependent phase pre-distortion. Rather, Moriyama teaches frequency-independent phase pre-distortion. Frequency-independent phase pre-distortion refers to pre-distortion of the phase of an input signal, where the amount of phase pre-distortion is independent of the frequency of the input signal. In typical frequency-independent phase pre-distortion, the amount of phase pre-distortion is a

function of the signal power. Frequency-dependent phase pre-distortion, on the other hand, refers to pre-distortion of the phase of an input signal, where the amount of phase pre-distortion is a function of the frequency of the input signal.

7. While it is true that Moriyama teaches phase pre-distortion, the phase pre-distortion in Moriyama is independent of the frequency of the input signal. See, e.g., Moriyama's Fig. 62, which shows the dependence of the gain and phase of the amplifier output signal on the input signal power. See also column 54, lines 29-31 ("as shown in FIG. 62, the output phase of the transmission power amplifier 30 varies in dependence upon the input power (input level)") There is no similar discussion anywhere in Moriyama about the dependence of either the gain or the phase of the amplifier output signal on the frequency of the input signal.

8. The teachings in Moriyama are directed to three different signal-processing techniques: (1) frequency-independent phase pre-distortion, (2) phase-shift nulling, and (3) offset compensation for an orthogonal modulator.

9. As discussed previously, Moriyama's frequency-independent phase pre-distortion relates to pre-distortion of the phase of an input signal to compensate for phase distortion during amplification of the input signal by an amplifier, where the amount of phase distortion caused by the amplifier -- and therefore the amount of compensating phase pre-distortion applied to the input signal prior to that amplification -- is dependent on the input signal power, as shown, for example, in Fig. 62. There is no teaching or even suggestion in Moriyama that the phase pre-distortion is dependent on the frequency of the input signal.

10. The second technique taught in Moriyama is phase-shift nulling, which relates to the adjustment of the phase of the input signal to ensure that the phase of the output signal matches the phase of the input signal. This phase adjustment is shown, for example, in Moriyama's Fig. 7A, where phase-difference measurement unit 24e measures the difference in phase $d\theta$ between the signal represented by I and Q and a feedback signal represented by I_F and Q_F, where the phase difference $d\theta$ is applied to phase-difference

correction unit 24h, which rotates the signal I, Q to form a phase-adjusted signal represented by I_C and Q_C. Significantly, this phase adjustment is independent of the frequency of the input signal.

11. The third technique taught in Moriyama is offset compensation for an orthogonal modulator. An ideal orthogonal modulator modulates an input carrier signal to generate a resulting modulated signal that contains none of the input carrier signal. However, due to imperfections in a real-world implementation of an orthogonal modulator (referred to in Moriyama as "offset"), some carrier signal may leak through to the modulated signal. To address this problem, Moriyama shifts the phase of the reference carrier wave to compensate for this carrier leakage. Significantly, this offset compensation has nothing to do with frequency-dependent phase pre-distortion to compensate for phase distortion caused by an amplifier.

12. The passages in Moriyama cited by the Examiner do not support the Examiner's conclusion that Moriyama teaches frequency-dependent phase pre-distortion. In particular, the Abstract suggests shifting "the phase of the reference carrier wave in such a manner that the leakage carrier (offset) becomes zero." This teaching relates to offset compensation for an orthogonal modulator and has nothing to do with frequency-dependent phase pre-distortion for an amplifier.

13. Similarly, in column 26, lines 52-53, Moriyama teaches that "the baseband outputs of the orthogonal detector 135 are rotated in terms of phase by the difference frequency between two reference carrier frequencies, thereby making it possible to obtain the offset of the orthogonal detector." Column 27, lines 36-37, contains analogous teachings for orthogonal detector 206. These teachings are also related to offset compensation for orthogonal modulators and have nothing to do with frequency-dependent phase pre-distortion for an amplifier.

14. In column 4, lines 25-27, Moriyama suggests that "a technique which corrects for phase difference is required in a communication apparatus having a distortion compensating

function." These teachings refer generally to both Moriyama's phase pre-distortion and Moriyama's phase-shift nulling, neither of which is dependent on the frequency of the input signal.

15. Danielsons teaches only a single frequency-independent magnitude and phase pre-distortion path (see, e.g., Fig. 16).

16. The teachings in column 2, lines 22-30, of Danielsons are related to the goal of removing the dependence of the data signal on the frequency of the digital data rate. This has nothing to do with the application of pre-distortion that is independent of the frequency of the data signal.

17. Danielsons teaches in Fig. 16 four signal processing circuits upstream of the amplifier circuitry: frequency response and phase corrector circuits 160 and 166, phase corrector circuit 162, and linearity corrector circuit 164. Phase corrector circuit 162 applies frequency-independent phase pre-distortion, while linearity corrector circuit 164 applies frequency-independent magnitude pre-distortion. Frequency response and phase corrector circuits 160 and 166, on the other hand, are equalizers that compensate for the amplifier's imperfect frequency response, where the correction is independent of the magnitude of the input signal. See, e.g., column 12, lines 5-10 and 35-45. As such, frequency response and phase corrector circuits 160 and 166 do not apply pre-distortion as that term is known and used by those skilled in the art.

18. The teachings in column 2, lines 22-30, of Danielsons relate to the processing of frequency response and phase corrector circuits 160 and 166, not to the processing of phase and linearity corrector circuits 162 and 164. In other words, the cited teachings relate to equalization processing, not to pre-distortion processing.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are

punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

March 10, 2006
Date

G. Vella-Coleiro
George P. Vella-Coleiro